MODIFICATION OF PROBE ASSEMBLIES

This report describes the mechanical modifications made to the scintillation counter probe developed on program A075 in an effort to increase its resistance to severe handling. The results of vibration testing of the modified probe and the electronic unit associated with it.

One NTG probe (No. 7) was disassembled and modified, and after modification vibration tested as per the specifications outlined in your letter dated May 19, 1960. The primary purpose of this modification is to increase the life of the optical coupling between the lucite light-pipe and the face of the photomultiplier tube.

The following modifications were made as are shown in Figures 1 and 2:

1. Centered the hevi-metal shield and collimator in the probe housing by the use of metal sleeves, and rigidly fastened the hevi-metal to the housing with two screws.

2. Floated the photomultiplier tube inside of the housing utilizing a part of the sleeve that centers the hevi-metal and a ground down "0" ring for centering the tube.

3. Spring loaded the photomultiplier tube with a helical spring for proper tension.

4. A 0.010 inch washer, made of paper, was inserted between the "hevi-met" collimator and photomultiplier tube face (cathode) to prevent formation of spurious pulses at the anode. The "hevi-met" was shortened 0.010 inch to maintain the same over-all length when the washer was cemented into place with plyabond rubber adhesive.

The modified probe was then reassembled and the output pulse from the cathode-follower was measured using a 0.5 curie Cs-137 gamma-ray source for signal. This pulse height was measured before and after the resonant frequency test and remained unchanged. The probe was then vibration tested in three mutually perpendicular directions with the pulse height being monitored throughout the vibration test. There were no changes in the pulse output.

In attempting to vibration test the NTG electronics, we were not so successful, as the unit failed after 45 minutes of vibration. Upon examining the parts layout, mounting and wiring scheme, one concludes that while the electronics will withstand severe handling abuses it will not withstand a vibration test. The major reason for the failure appears to be the electronic component mounting which for the most part are leads attached to buss bars and which snap off under vibration. The electronic components referred to are resistors, condensers, and silicon rectifiers.

The NTG electronics was repaired with the following components being replaced: two low voltage silicon rectifiers, one high voltage corona regulater tube, one resistor and two 6AQ5 tubes.

At the present time only one material is available for testing the NTG assembly, i.e. Silicon ($Si0_2$) Sand. The sand closely approximates concrete and in performing the standard penetration of a simulated wall the unit follows the standard calibration curve presented in the NTG Handbook.

It is our conclusion that the modified probe is extremely rugged and that the shelf life of the optical coupling will be greatly extended although this latter point can only be confirmed by shelf or use tests of

sufficiently long duration. Some modification of the electronics would appear to be in order to increase the ruggedness of this part of the system.

Respectfully submitted,

[redacted] 25X1

Nuclear Physics Section.

APPROVED BY:

[redacted] 25X1

Director of Physics Research.

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MODIFICATION OF PROBE ASSEMBLIES

Final Report

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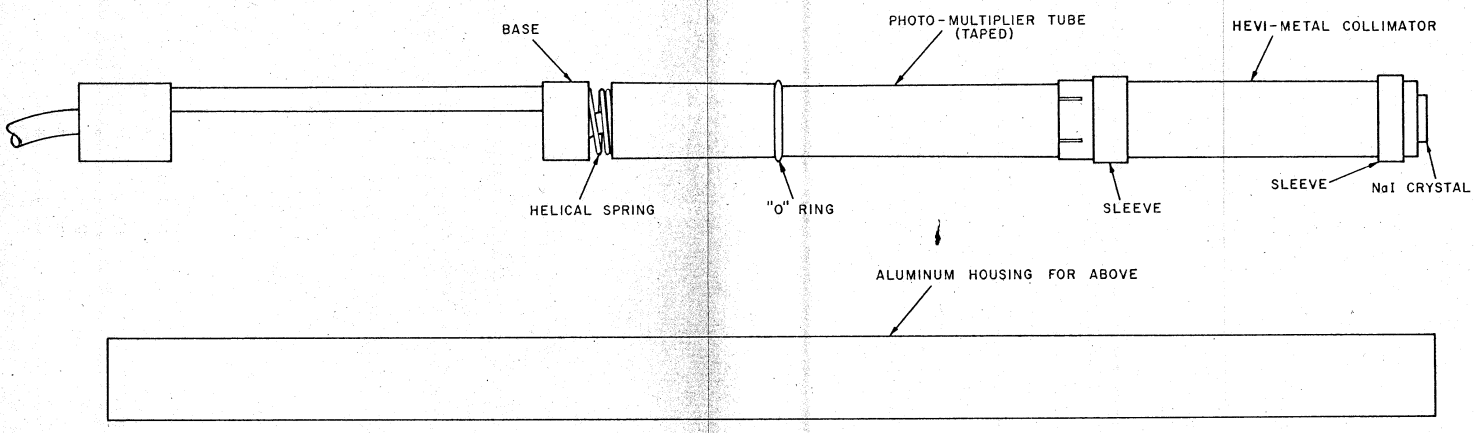
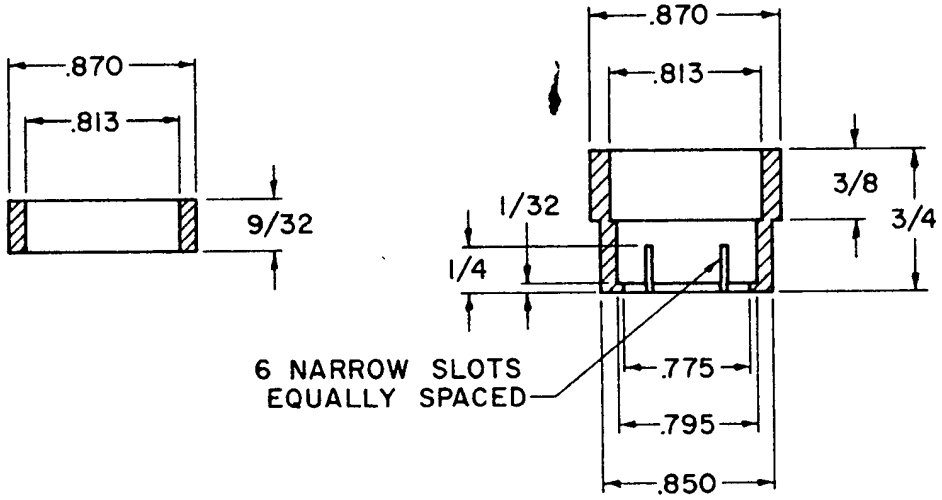


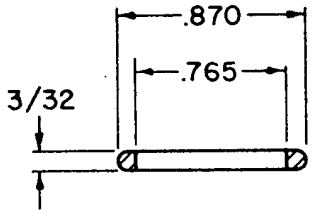
FIG. I NTG MODIFIED PROBE ASSEMBLY

"HEVI-MET" AT PHOTOMULTIPLIER END SHORTENED .010

.010 PLYABOND PAPER WASHER CEMENTED ON

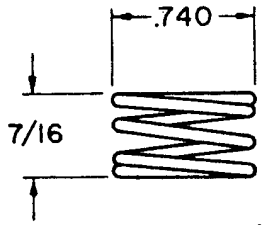


ADDITION OF SLEEVES



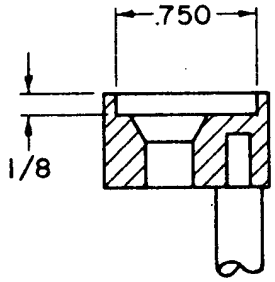
DIMENSIONS GIVEN APPLY TO RING IN INSTALLED POSITION OVER TAPED PHOTOTUBE

ADDITION OF "O" RING



WOUND OF .047 MUSIC WIRE

ADDITION OF SPRING



COUNTERBORED RECESS IN BASE FOR SPRING

MODIFICATION OF BASE

FIG. 2 MODIFICATION DETAILS OF NTG PROBE ASSEMBLY

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